VERIFICATION OF TRANSLATION

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[Title of the Invention]

INK JET PRINTER

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[List of Attached Documents]

[Name of Document]	Specification	1
[Name of Document]	Drawings	1
[Name of Document]	Abstract	1
[Power of Attorney Number]	9505720	
[Power of Attorney Number]	9809444	
[Power of Attorney Number]	0018483	

[Necessity or not of a proof] Necessity

[Name of Document] Specification

[Title of the Invention] INK JET PRINTER

[Claims]

[Claim 1]

An ink jet printer, comprising:

a conveyor belt for conveying a record medium;

a printing head opposing a surface of the conveyor belt, and configured to eject ink to the surface of the conveyor belt;

a gas injection means disposed at one side of the conveyor belt in a width direction thereof, and configured to inject gas along the surface of the conveyor belt in a direction crossing a conveying direction; and

an ink absorber disposed at an other side of the conveyor belt in the width direction thereof so as to oppose an injecting direction of gas from the gas injection means.

[Claim 2]

The ink jet printer according to claim 1, wherein the conveyor belt has a loop-shaped conveying path, which includes an upper path and a lower path,

wherein the printing head is placed to oppose the surface of the conveyor belt on the upper path, and

wherein the gas injection means injects the gas on the upper path.

[Claim 3]

The ink jet printer according to claim 1 or 2, wherein the conveyor belt further has a recess in the surface thereof, the recess formed along a direction crossing the conveying direction.

[Claim 4]

The ink jet printer according to claim 3, wherein a sidewall of the recess at an upstream side in the conveying direction is formed so as to be located at more upstream side in the conveying direction as approaching the ink absorber.

[Claim 5]

The ink jet printer according to claim 3 or 4, wherein a portion where the recess is formed is water repellent.

[Claim 6]

An ink jet printer, comprising:

a conveyor belt for conveying a record medium, the conveyor belt having one or more opening;

a printing head opposing a surface of the conveyor belt, and configured to eject ink to the surface of the conveyor belt;

an ink receiver opposing the printing head with the conveyor belt being interposed between the ink receiver and the printing head, the ink receiver receiving ink, which is

ejected from the printing head and has passed through the opening;

a gas injection means for injecting gas toward the ink receiver; and

an ink absorber disposed adjacent to the ink receiver, so as to oppose an injection direction of the gas from the gas injection means.

[Claim 7]

The ink jet printer according to claim 6, wherein a surface of the ink receiver on which the ink is received is water repellent.

[Detailed Description of the Invention]

[0001]

[Technical Field]

The present invention relates to an ink jet printer for making a record on a record medium by ejecting ink to the recording medium.

[0002]

[Background Art]

The ink jet printer is an apparatus to print a desired image on a sheet of paper, which is conveyed by a conveying unit such as a conveyor belt, by ejecting ink to the sheet of paper from nozzles of printing heads. In this kind of printer, it is important to maintain ink ejection in a good condition, by preventing the nozzles of the

2: printing head

3: ink

6, 7: belt roller

8: conveyor belt

8a: belt surface

8X: upper path

8Y: lower path

14: air injector (gas injection means)

15: recess

15a, 15b: sidewall (of recess)

16: absorber (ink absorber)

23: opening

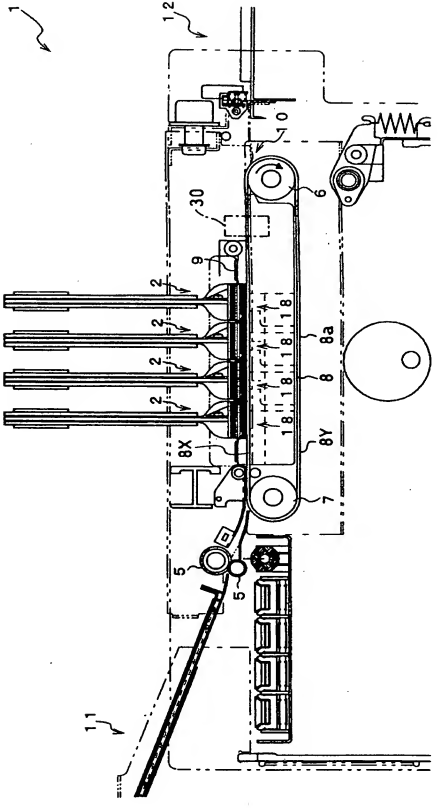
40: container (ink receiver)

16: absorber (ink absorber)

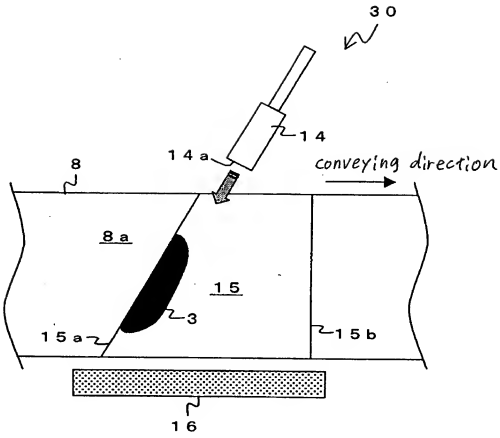
30: air injection area

[Name of Document] DRAWINGS

[Fig. 1]

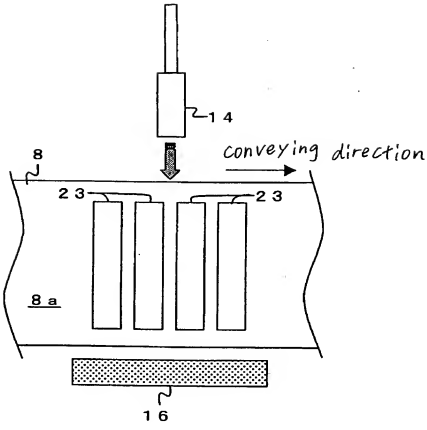


[Fig. 2]

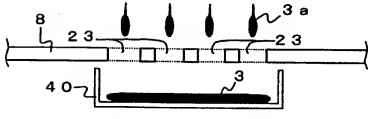


[Fig. 3]

(a)



(b)



[Destination of Document] ABSTRACT

[Abstract]

[Problem] To provide an ink jet printer, which can remove ejected ink effectively in the case where the flushing is performed on the conveying path of the conveyor belt.

[Means for Resolution] On the surface of a conveyor belt 8, which conveys a record medium such as a sheet of paper, a recess 15 is formed along the direction that crosses the conveying direction. The sidewall 15a of the recess 15 upstream in the conveying direction is shaped to be more upstream in the conveying direction as it approaches the absorber 16. Ink 3 ejected into the recess 15 during the flushing moves along the sidewall 15a of the recess 15, upstream in the conveying direction, by the inertial force created by the conveying operation. An air injection area 30 is formed downstream with respect to the printing head, which performs the flushing, in the conveying direction. An air injector 14 and the absorber 16 are placed on both sides of the conveyor belt 8, opposing each other. When the recess 15 of the conveyor belt 8 reaches the air injection area 30, compressed air is injected from a nozzle 14a of the air injector 14. This moves the ink 3 in the recess 15 along with the compressed air to the absorber 16, so that the ink 3 is absorbed by the absorber.

[Selected Figure] FIG. 2

printing heads from being dried. Accordingly, it is known that some types ink jet printers periodically performs an operation of forcibly ejecting ink from the nozzles in a specific area other than the paper sheet (hereinafter referred to as "flushing") during the printing.

[0003]

When the flushing area is set to be a specific area except for the conveying path of the conveyor belt, in the case of serial printing heads, which perform printing while reciprocally moving in width direction of the paper sheet, the flushing can be performed in a single procedure of the reciprocating operation of a head. Thus, the printing is rarely stopped and the printing speed is rarely decelerated. However, in the case of fixed line printing heads, it is necessary to move the printing heads to the flushing position out of the conveying path. This causes a considerable amount of time loss, and continuous printing or high speed printing is not realized.

[0004]

Therefore, there was proposed an approach, in which the flushing area is set on the conveying path of the conveyor belt so that the flushing is performed without stopping the printing. Here, in the case where the flushing area is formed on the surface of the conveyor belt and ink is ejected to the flushing area, it is necessary to

remove the ink from the surface so that the ink does not scatter to the conveying path of the conveyor belt, in particular, to the winding position.

[0005]

In order to remove the ink from the surface of the conveyor belt, a cleaning technique (for example, see Patent Document 1) can be adopted. The cleaning technique uses a cleaning brush, a mangle roller and a wiping roller, in which at least a circumference of the wiping roller is made of a porous material. Cleaning is performed by supplying water to the cleaning brush, and water droplets are removed by butting the mangle roller against the conveyor belt, to which the water droplets are attached. The residual water droplets, which are not removed by the mangle roller, are removed by the wiping roller.

[0006]

[Patent Document 1]

Japanese Unexamined Patent Application No. 11-192694 (page 4, FIG. 2)

[0007]

[Problems to be solved]

However, this technique is devised to butt two rollers against the conveyor belt to remove water, but has limitations in water-removing effect. In the position of

the cleaning brush, the ink on the conveyor belt is diluted with water and the quantity of moisture in the ink increases, which makes it more difficult to remove water. If the conveyor belt is conveyed in this state, the ink or the moisture is scattered and adheres to other members of the printer. In addition, in this construction, the diluted ink tends to adhere to wide areas, thereby making the removing operation more difficult. Furthermore, even if the moisture can be removed using the two rollers, it should be appreciated that ink components are not removed.

[0008]

Therefore, an object of the invention is to provide an ink jet printer, which can remove ejected ink effectively in the case where the flushing is performed on the conveying path of the conveyor belt.

[0009]

[Means for solving the Problems]

In order to realize the foregoing object, the ink jet printer according to claim 1 includes a conveyor belt for conveying a record medium; a printing head opposing a surface of the conveyor belt, and configured to eject ink to the surface of the conveyor belt; a gas injection means disposed at one side of the conveyor belt in a width direction thereof, and configured to inject gas along the

surface of the conveyor belt in a direction crossing a conveying direction; and an ink absorber disposed at an other side of the conveyor belt in the width direction thereof so as to oppose an injecting direction of gas from the gas injection means.

[0010]

Although ink resides on the surface of the conveyor belt when the flushing is performed on the surface, this construction can inject gas to move the ink residing on the surface of the conveyor belt, so that the moved ink can be absorbed by the ink absorber. This can prevent a conventional problem in that the ink is diluted with water, the moisture of the ink increases, and the ink adheres to wide areas. Accordingly, even when line printing heads are used, it is possible to realize continuous printing and high speed printing and to remove the residual ink from the surface of the conveyor belt effectively by performing the flushing on the conveyor belt surface.

[0011]

The ink jet printer of claim 2 according to claim 1 is characterized in that the conveyor belt has a loop-shaped conveying path, which includes an upper path and a lower path, the printing head is placed to oppose the surface of the conveyor belt on the upper path, and the gas injection means injects the gas on the upper path.

[0012]

The conveying path of the conveyor belt is loop-shaped, and when the printing head is placed on the upper path, the flushing is performed on the upper path where the printing head is placed. Here, if the gas injector injects gas on the lower path, the ink residing on the conveyor belt by the flushing scatters and adheres to other members while it moves from the upper path to the lower path. Accordingly, it is possible to prevent the ink from scattering by injecting gas from the upper path.

[0013]

The ink jet printer of claim 3 according to claim 1 or 2 is characterized in that the conveyor belt further has a recess in the surface thereof, the recess formed along a direction crossing the conveying direction.

[0014]

When the flushing is performed on the flat surface of the conveyor belt, the ink tends to flow along the length of the conveyor belt, in particular, upstream in the conveying direction, thereby residing in wide areas. And if gas is injected to the ink, which is scattered widely on the conveyor belt, the ink can scatter more widely. Accordingly, the recess is formed in the conveyor belt surface, along the direction that crosses the conveying direction, and the flushing is performed in the

direction to the interior of the recess, so that the scattering can be restricted inside the recess. Furthermore, when the gas is injected to the ink adhered in the recess, it is possible to move the ink without scattering out of the recess. Therefore the ink is removed more effectively.

[0015]

The ink jet printer of claim 4 according to claim 3 is characterized in that a sidewall of the recess at an upstream side in the conveying direction is formed so as to be located at more upstream side in the conveying direction as approaching the ink absorber.

[0016]

Due to the inertial force created by the conveying operation of the conveyor belt, the ink ejected into the recess tends to move upstream in the conveying direction. Accordingly, the sidewall is not formed along the width direction of the conveyor belt, but is formed to be more upstream in the conveying direction as it approaches the ink absorber. Then, it becomes easier to make the ink cohere in the sidewall of the recess upstream in the conveying direction, in a position adjacent to the ink absorber. The ink can be moved to the ink absorber more effectively by injecting the gas to the cohered ink, and thereby removed from the surface of the conveyor belt

more easily.

[0017]

The ink jet printer of claim 5 according to claim 3 or 4 is characterized in that a portion where the recess is formed is water repellent.

[0018]

According to this construction, the ink can be easily bounced from the surface of the recess, and thus can be moved in response to the gas injected by the gas injector efficiently. Accordingly, the ink can be removed more effectively.

[0019]

The ink jet printer according to claim 6 includes a conveyor belt for conveying a record medium, the conveyor belt having one or more opening; a printing head opposing a surface of the conveyor belt, and configured to eject ink to the surface of the conveyor belt; an ink receiver opposing the printing head with the conveyor belt being interposed between the ink receiver and the printing head, the ink receiver receiving ink, which is ejected from the printing head and has passed through the opening; a gas injection means for injecting gas toward the ink receiver; and an ink absorber disposed adjacent to the ink receiver, so as to oppose an injection direction of the gas from the gas injection means.

[0020]

According to this construction, the flushing is performed over the opening of the conveyor belt, the ink passed through the opening is received in the ink receiver, and the gas is injected toward the ink receiver, so that the ink collected in the ink receiver can be moved to and absorbed by the ink absorber. Accordingly, even when line printing heads are used, it is possible to realize continuous printing and high speed printing and to remove the residual ink from the ink receiver effectively by performing the flushing on the conveying path of the conveyor belt.

[0021]

The ink jet printer of claim 7 according to claim 6 is characterized in that a surface of the ink receiver on which the ink is received is water repellent.

[0022]

According to this construction, the ink can be easily bounced from the ink-receiving surface of the ink receiver, and thus can be moved easily by the gas injected from the gas injector. Therefore, the ink can be removed more effectively.

[0023]

[Embodiments of the Invention]

Hereinafter, the invention will be described more

particularly with reference to the accompanying drawings, in which exemplary embodiments thereof are shown.

[0024]

First, an ink jet printer according to a first embodiment of the invention will be described with reference to FIG. 1. FIG. 1 is a side elevation view illustrating the overall construction of the ink jet printer according to the first embodiment of the invention. The ink jet printer 1 is designed for color printing, and includes a paper feed unit 11, which is placed in the left part of the drawing, and a paper discharge unit 12, which is placed in the right part of the drawing. A paper conveying path leading from the paper feed unit 11 to the paper discharge unit 12 is provided inside the printer.

[0025]

Paper feed rollers 5 are disposed just downstream of the paper feed unit 11, and are adapted to send a sheet of paper as a record medium from left to right of the drawing. In a central part of the paper conveying path, two belt rollers 6 and 7 and a conveyor belt 8 wound on the rollers 6 and 7 are disposed. The conveyor belt 8 is in the form of a loop, which includes an upper path 8X and a lower path 8Y. Silicone treatment is performed on the conveyor belt surface 8a, so that a sheet of paper, which

is fed by the feed rollers 5, can be held to the surface 8a of the upper path 8X of the conveyor belt by the adhesion of the surface 8a while the paper sheet is being conveyed to the downstream (to the right in FIG. 1) by the actuation of the belt roller 6.

[0026]

Printing heads 2 are provided opposing the surface 8a of the upper path 8X of the conveyor belt 8, and the paper conveying path is formed in a gap between the underside of the printing heads 2 and the conveyor belt surface 8a. Four of the printing heads 2, which correspond to four color inks (magenta, yellow, cyan and black), are arranged along the paper conveying direction. Each of the printing heads 2 is shaped as a slender and long box, which extends along the direction perpendicular to the drawing plane of FIG. 1. A head body 18 is provided on the underside of the individual printing head 2, and has an array of minute nozzles (not shown) for ejecting ink to the conveyor belt surface 8a.

[0027]

Due to this construction, the paper sheet conveyed on the conveyor belt surface 8a sequentially passes under the head bodies 18 of the four printing heads 2, and the nozzles eject respective colors of ink to the surface (i.e., printing surface) of the paper sheet so that a desired

color image can be formed.

[0028]

A push member 9 is disposed downstream of the printing heads 2 in the conveying direction. The push member 9 pushes the paper sheet onto the conveyor belt surface 8a in order to securely bond the paper sheet to the conveyor belt surface 8a so that the paper sheet is not detached from the conveyor belt surface 8a.

[0029]

An air injection area 30 is provided further downstream of (i.e., right from) the push member 9, so that ink, which was ejected to the conveyor belt surface 8a in flushing, can be removed from the conveyor belt surface 8a. The air injection area 30 will be described more particularly later. A peeling device 10 is provided in a further downstream position adjacent to one end of the conveyor belt 8. The peeling device 10 is designed to peel the paper sheet from the conveyor belt surface 8a and send the paper sheet to the paper discharge unit 12 in the right.

[0030]

Next, with reference to FIG. 2, it will be described of the construction of the conveyor belt 8 according to this embodiment and the construction of the respective members arranged on the air injection area 30 downstream of the printing heads 2. The air injection area 30 is formed

on the upper path 8X of the conveying path of the conveyor belt 8, that is, at the same side as the printing heads 2.

[0031]

A recess 15 is formed on the surface 8a of the conveyor belt 8, along the direction that crosses the paper conveying direction of the belt 8 (i.e., the direction designated by the arrow in FIG. 2). An area of the recess 15 surrounded by two sidewalls 15a and 15b is sunken than surrounding portions. More specifically, in the recess 15, the sidewall 15a upstream in the conveying direction (i.e., left in the drawing) is formed to be more upstream in the conveying direction (i.e., further left in the drawing) as approaching an absorber 16. The sidewall 15b, downstream in the conveying direction (i.e., right in the drawing) is formed along the width direction of the conveyor belt 8. Meanwhile, water repellent treatment is performed on the inner surface of the recess 15.

[0032]

The recess 15 is an area where the flushing is to be performed, and in the flushing, allows ink 3 ejected from the printing heads 2 to gather in the recess 15 without flowing out of the recess 15. Like this, as the flushing is performed, inertial force in response to the conveying operation of the conveyor belt 8 causes the ink 3, which was ejected into the recess 15 from the printing heads 2,

to migrate to an upper portion (left in FIG. 2) of the wall portion 15a of the recess 15. When the recess 15 of the conveyor belt 8 reaches the air injection area 30, as shown in FIG. 2, the ink 3 is cohered on a slope of the sidewall 15a of the recess 15, which is upstream (left in FIG. 2) with respect to the conveying direction.

[0033]

The recess 15 in use for the flushing is formed in a predetermined area of the conveyor belt surface 8a, and the remaining area of the conveyor belt surface 8a becomes an area for conveying the paper sheet.

[0034]

In the air injection area 30, an air injector 14 is disposed adjacent to one side, and an absorber 16 is disposed adjacent to the opposite side of the conveyor belt 8 in the width direction thereof. The air injector 14 has a nozzle hole 14a at one end, adjacent to the conveyor belt 8, and has the opposite end connected to an air bombe (not shown). The air injector 14 injects the compressed air, which is supplied from the air bombe, through the nozzle 14a. The nozzle of the air injector is directed to the direction along an inclined angle substantially the same as that of the sidewall 15a of the recess 15, which is upstream (left in FIG. 2) with respect to the conveying direction, so that the compressed air is injected toward

the opposite side of the conveyor belt 8 in the width direction thereof, along the bottom and the sidewall 15a of the recess 15.

[0035]

The absorber 16 and the air injector 14 are placed on both sides of the conveyor belt 8, so that the absorber 16 is disposed opposite to the injecting direction of the compressed air. The absorber 16 is made of a polymeric porous material such as urethane, and is configured to be longer than the recess 15 at the opposite side in the width direction of the conveyor belt 8 and to include the height of a space defined by the recess 15.

[0036]

Due to this configuration, in the air injection area 30 on the paper conveying path, the ink 3 adhered on the sidewall 15a of the recess 15 migrates along with the compressed air injected from the air injector 14, and thus is absorbed by the absorber 16.

[0037]

According to the ink jet printer 1 of this embodiment as set forth above, when the flushing is performed on the surface 8a, even when the ink resides on the conveyor belt surface 8a, it is possible, by injecting the compressed air from the air injector 14, to migrate the residual ink 3 on the conveyor belt surface 8a and to be absorbed by the

absorber 16. Then, the ink 3 is not diluted with water, the moisture of the ink 3 does not increase, or the ink 3 does not widely adhere to the surface. Accordingly, when the flushing is performed on the conveyor belt surface 8a, even when line printing heads 2 are used, continuous printing and high speed printing can be realized and the ink 3 residing on the conveyor belt surface 8a can be removed effectively.

[0038]

In the case where the conveying path of the conveyor belt 8 is a loop and the flushing is performed on the upper path 8X where the printing heads 2 are arranged, if the air injection area 30 where the air injector 14 and the absorber 16 are disposed is set as the lower path 8Y, the ink 3 ejected to the conveyor belt surface 8a (the recess 15) by the flushing scatters and adheres to other members while it moves from the upper path 8X to the lower path 8Y. Accordingly, as in this embodiment, when the air injection area 30 is provided on the upper path 8X, downstream of the printing heads 2, it is possible to absorb and remove the ink 8 by the absorber 16 before the ink 8 reaches the lower path 8Y. Therefore it is possible to prevent the ink from scattering.

[0039]

In the case where the conveyor belt is shaped flat

without the recess 15 on the surface 8a thereof, the ink 3, which is adhered to the surface by the flushing, tends to flow in the longitudinal direction of the conveyor belt 8 (particularly, upstream in the conveying direction) along with the running of the conveyor belt 8, thereby enlarging the area to which the ink is adhered. And if the compressed air is injected from the air injector to the ink 3, which is widely adhered to the conveyor belt 8, the ink is dispersed more widely. Accordingly, when the recess 15 is formed in the conveyor belt surface 8a along the direction crossing the conveying direction and the flushing is performed in the recess 15, it is possible to make the adhering range of the ink 3 subsequent to the flushing be maintained within the recess 15. Furthermore, it is possible to inject the compressed air to the ink 3, adhered in the recess 15, in order to move the ink 8 and prevent the ink 3 from scattering over the recess 15. Therefore the ink 3 is removed more effectively.

[0040]

Furthermore, in this embodiment, the both sidewalls 15a and 15b of the recess 15 are not formed along the width direction of the conveyor belt 8 (i.e., the direction perpendicular to the conveying direction). Rather, the sidewall 15a of the recess 15, upstream in the conveying direction, is sloped to be more upstream as it approaches

the absorber 16. In this construction, the ink ejected into the recess 15 by the flushing naturally migrates on the sloped sidewall 15a toward the absorber 16 due to the inertial force directed to the upstream in the conveying direction, which takes place in response to the running of the conveyor belt 8. In addition, the compressed air injected as above can help the ink 3 to migrate to the absorber 16 effectively. Therefore the ink 3 is removed more effectively.

[0041]

Since water repellent treatment is performed on the inner surface of the recess 15, the ink ejected into the recess 15 can be bounced from the surface easily . Thus, the injection of the compressed air by the air injector 14 can move the ink 3 efficiently. Therefore the ink 3 is removed more effectively.

[0042]

Next, an ink jet printer according to a second embodiment of the invention will be described with reference to FIG. 3 (a) and (b). FIG. 3 (a) is a schematic surface view illustrating the construction of a conveyor belt 8 according to this embodiment and the construction of respective members arranged on a position of a paper conveying path where printing heads are disposed. FIG. 3 (b) is a cross sectional view of FIG. 3 (a) taken along the

longitudinal direction of the conveyor belt. Since the overall construction of the ink jet printer of this embodiment is the same as that of the ink jet printer of the first embodiment as shown in FIG. 1, description thereof will be omitted.

[0043]

As shown in FIG. 3 (a), in this embodiment, an array of four openings 23 is formed in the conveyor belt 8. These openings 23 have substantially the same configuration as the plane of the afore-mentioned head bodies 18 of the printing heads 2.

[0044]

In addition, an air injector 14 is placed at one side of the conveyor belt 8 in the width direction thereof, and an absorber 16 is placed at the opposite side of the conveyor belt 8 in the width direction thereof. The air injector 14 and the absorber 16 have the same configuration as in the first embodiment of the invention shown in FIG. 2, except for the position of the air injector 14 and the absorber 16. While the air injector 14 and the absorber 16 are placed in the air injection area 30 downstream of the printing heads 2 in the first embodiment, they are placed directly below the printing heads 2 in this embodiment.

[0045]

In addition, while the air injector 14 is inclined

with respect to the width direction of the conveyor belt 8 in the first embodiment, it is arranged along the width direction of the conveyor belt 8 in this embodiment. Furthermore, while the compressed air from the air injector 14 is injected along the sloped sidewall 15a on the conveyor belt surface 8a in the first embodiment, it is injected into a container 40 shown in FIG. 3 (b). Accordingly, the air injector 14 of this embodiment is placed at the same height of the container 40 as shown in FIG. 3 (b), and behind the conveyor belt 8 in FIG. 3(b).

[0046]

In addition, as in the first embodiment, the absorber 16 and the air injector 14 are placed on both sides of the conveyor belt 8, so that the absorber 16 is disposed opposite to the injecting direction of the compressed air. The absorber 16 is also placed adjacent to the container 40. The height of the absorber 16 is the same as that of the air injector 14 in this embodiment, that is, the height of the container 40 below the conveyor belt 8 as shown in FIG. 3 (b). The absorber 16 is placed front side of the container 40in FIG. 3 (b).

[0047]

The container 40 shown in FIG. 3 (b) and the printing heads 2 shown in FIG. 1 are placed to oppose each other, on both sides of the conveyor belt 8. The container 40 has a

box-like configuration, which includes a rectangular bottom and an opened upper face (i.e., a face in the side of the printing heads 2). The rectangular bottom face is slightly larger than an area delineated by the outer circumference embracing the four openings 23. The inner surface that stores the ink 3 is water repellent treated. In the container 40, a side face in the longitudinal direction of the conveyor belt 8 has a hole, through which the compressed air from the air injector 14 can flow and the ink 3 can migrate toward the absorber 16. However, the hole is configured to prevents the ink 3 collected in the container 40 from flowing out to any places except for the ink absorber 16.

[0048]

Due to this construction, when ink droplets 3a are ejected from the four printing heads 2 shown in FIG. 1, they pass through the openings 23 shown in FIG. 3 (b) and then are stored inside the container 40. The ink 3 collected in the container migrates along with the compressed air, supplied from the air injector 14, and then is absorbed by the absorber 16.

[0049]

As described above, according to the ink jet printer of this embodiment, the flushing is performed over the openings 23 of the conveyor belt 8, the ink droplets 3a

passed through the openings 23 are stored in the container 40, and the air injector 14 injects the compressed air toward the container 40. Therefore the ink 3 collected in the container 40 migrates to the ink absorber 16, so that the ink 3 is absorbed by the ink absorber 16. As a result, even when the printing heads are of a line type as in this embodiment, the flushing can be performed in the conveying path of the conveyor belt 8. Therefore continuous printing and high speed printing are realized while removing the residual ink 3 from the container 40 effectively.

[0050]

Furthermore, since the inner surface of the container 40 is water repellent treated, the ink 3 can easily bounce from the inner surface of the container 40, which stores the ink 3, and thus can be easily moved by the compressed air injected from the air injector 14. Therefore, the ink 3 can be removed more effectively.

[0051]

While the invention has been described with respect to the exemplary embodiments thereof, it is not intended to limit the invention. Rather, the invention can be modified into various forms without departing from the scope that shall be defined by the accompanying claims.

[0052]

For example, while it has been described that the

paper sheet is adopted as the record medium in the foregoing embodiments, various other materials except for the paper sheet can be used as a record medium.

[0053]

In addition, the number of the printing heads 2 is not limited to four (4), but is preferably one or more. Furthermore, the printing heads 2 can be of a serial type rather than the line type.

[0054]

The conveying path of the conveyor belt 8 is not limited to the loop, but can adopt various forms such as a linear type of the same height and a stepped type having a plurality of heights. In the case of the conveyor belt 8 having a conveying path except for the loop, the height of the air injection area 30 in the first embodiment is preferably the same as that of the printing heads 2 in terms of preventing the ink 3 from scattering. However, it is not intended to limit the invention.

[0055]

As the air injector 14, a plurality of air injectors can be used instead of a single air injector. In particular, in the second embodiment, four air injectors 14 can be preferably provided for the four openings 23, respectively.

[0056]

While the compressed air is injected by the air injector 14 in the foregoing embodiments, other gases except for the air can be injected as long as the ink 3 can be migrated by the injection.

[0057]

The absorber 16 can be made of various liquid-absorbing materials except for urethane. Furthermore, the whole portion of the material of the ink absorber 16 does not necessarily absorb liquid but a surface portion thereof may absorb liquid. For example, the absorber can include what is wrapped with cloth. In addition, it is possible to adopt a construction that can absorb the ink 3 using the ink absorber 16 as well as remove the absorbed ink 3 by sucking the ink 3 from the ink absorber 16.

[0058]

The water repellent treatment is performed on the inner surface of the recess 15 in the first embodiment and on the inner surface of the container 40 in the second embodiment. Instead of the water repellent treatment only on the surface, the material of the corresponding part can have water repellency. In terms of easy migration of the ink 3, it is preferable that the corresponding part is water repellent. However, this is not essential in the invention, but the corresponding part may not be water repellent.

[0059]

The recess 15 of the conveyor belt surface 8a in the first embodiment is not limited to the shape as shown in FIG. 2. For example, the sidewall 15b of the recess 15 downstream in the conveying direction can be formed with a slope as that of the upstream sidewall 15a or both the sidewall 15a and 15b can be formed along the width direction of the conveyor belt 8.

[0060]

In the first embodiment, the recess 15 can be omitted, but the recess 15 is preferably formed in terms of not scattering the ink 3, which is ejected in the flushing.

[0061]

In the second embodiment, various numbers of openings 23 can be provided in the conveyor belt 8 instead of the four openings 23. For example, it is possible to form only one opening 23, so that ink droplets 3a can be ejected sequentially from the four printing heads 2 through the opening 23. After the ink droplets 3a are ejected from all the printing heads 2, the ink 3 can be removed by air injection.

[0062]

Furthermore, the shape of the container 40 in the second embodiment is not limited to the hollow box shape as long as the container can store the ink 3 and allow the

compressed air to flow therethrough.

[0063]

Further, an ink receiver for receiving the ink 3 passed through the openings 23 can adopt other configurations except for the container 40. For example, the conveyor belt 8 can have a two ply structure, which includes passages 23 in the surface ply and a cavity capable of receiving ink in the underlying ply, so that the cavity can be used as the ink receiver.

[0064]

Moreover, in the second embodiment, while the absorber 16 is placed adjacent to the container 40, it can be placed in contact with the container 40. Alternatively, the absorber 16 can be configured to cover the absorber-side face of the container 40 shown in FIG. 3 (a). Then, the absorber can securely absorb the ink 3 blown from the container 40 by the compressed air.

[0065]

[Effects of the Invention]

As set forth above, according to claim 1, even when line printing heads are used, it is possible to realize continuous printing and high speed printing, and to remove the residual ink from the surface of the conveyor belt effectively by performing the flushing on the conveyor belt surface.

[0066]

According to claim 2, it is possible to prevent the ink from scattering inside the printer when the conveyor belt has a loop type conveying path.

[0067]

According to claim 3, the scattering can be restricted inside the recess, and it is possible to move the ink without scattering out of the recess. Therefore the ink is removed more efficiently.

[0068]

According to claim 4, the ink can be moved to the ink absorber more effectively by injecting the gas to the cohered ink, and thereby removed from the surface of the conveyor belt more easily.

[0069]

According to claim 5, the ink can be bounced from the surface of the recess easily, and thus can bemoved in response to the gas injected by the gas injector efficiently. Accordingly, the ink can be more effectively removed.

[0070]

According to claim 6, even when line printing heads are used, it is possible to realize continuous printing and high speed printing, and to remove the residual ink from the ink receiver effectively by performing the flushing on

the conveying path of the conveyor belt.

[0071]

According to claim 7, the ink can be rebounded easily from the ink-receiving surface of the ink receiver, and thus can be moved easily by the gas injected from the gas injector. Therefore, the ink can be removed more effectively.

[Brief Description of the Drawings]

FIG. 1 is a side elevation view illustrating the overall construction of an ink jet printer according to a first embodiment of the invention.

FIG. 2 is a schematic surface view illustrating the construction of the conveyor belt according to the first embodiment of the invention and the construction of respective members arranged on the air injection area downstream of the printing heads.

FIG. 3 (a) is a schematic surface view illustrating the construction of a conveyor belt according to a second embodiment of the invention and the construction of respective members arranged on a position of a paper conveying path where printing heads are disposed.

FIG. 3 (b) is a cross sectional view of FIG. 3 (a) taken along the longitudinal direction of the conveyor belt.

[Description of Reference Numerals and Signs]

1: ink jet printer